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ABSTRACT

Stella Center's belief in the basic importance of grammatical structure as a factor in reading comprehension substantiated the author's theory that the ability to comprehend syntactic structure is positively correlated with the ability to comprehend meaning. Original instruments devised to test this hypothesis included a test which utilized nonsense words arranged in conventional English sentence patterns, the "Perception of Alternate Structures Test" (PAST), and the "Agnate Sentences Test" (AST). Herbert Simon's "Deep Structure Recovery Test" (DSRT) was also used. Generally, it was noted that tests depending on nonsense vocabulary correlated less highly than those utilizing conventional vocabulary with reading comprehension tests. From this research, an eclectic model of language consisting of basal, operative, and expressive components is formulated to further explain the role of syntactic understanding in reading comprehension. (KS)

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ON LINGUISTIC STRUCTURE AND READING COMPREHENSION

Roy C. O'Donnell

If asked whether or not there is a positive correlation between ability to comprehend the syntactic structure of a sentence and ability to comprehend the meaning of a sentence, most people probably would answer in the affirmative. Stella Center, in The Art of Book Reading[1] (published nearly a quarter of a century ago), stated her belief in the basic importance of grammatical structure as a factor in reading comprehension as follows:

> Many a would be reader fails because he does not sense the grammar of a sentence--the logical relationship of word to word; thence the sentence conveys no meaning, or else an erroneous meaning. It is difficult to see how one can be a competent reader if he is not versed in this aspect of grammar--the relation of the structural elements that compose the sentence (p. 50).

Assuming that Center was referring to ability to sense grammatical relationships rather than ability to talk about them, I set out several years ago to find statistical evidence of the relationship between ability to recognize structural relationships of words in sentences and ability to comprehend written English[2]. The instrument I devised to measure ability to recognize structural relations did not require knowledge of grammatical terminology nor an extensive vocabulary. In order to encourage reliance on syntactic rather than semantic cues, the test utilized nonsense words arranged in conventional English sentence patterns. Normal word order, inflectional affixes, and function words were used.

I found a correlation between twelfth graders' scores on my structure test and scores on a reading test of .44, and I concluded that the teaching of grammatical structure as a means of improving reading comprehension was probably not justified. Furthermore, since the correlation between the reading test scores and scores on a vocabulary test was .76, it seemed likely that

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recognition of syntactic relations of words was far less important than knowledge of word meanings.

In spite of the results of my study (and the results of similar studies), I was unable to believe that Center's statement was entirely wrong. It is simply unthinkable that structural relationships of words do not contribute significantly to the meaning of a sentence.

Several years later, my interest in the connection between syntax and reading was revived when I saw the results of a study conducted by Herbert Simons[3]. The approach Simons used was different from mine, and his results were in line with what I had expected to find. He devised a test to measure ability in what he called "deep structure recovery", and he found a correlation of .73 between scores on his test and scores on a cloze test. The latter test he regarded as a better measure of reading comprehension than a standardized reading test.

Thinking that Simons' "Deep Structure Recovery Test" (DSRT) might be a more efficient instrument to measure sensitivity to syntactic structure than the test I had devised, I decided to investigate further the relationship between syntax and reading. With support from the Research Foundation of the National Council of Teachers of English, F. J. King and I carried out an experimental project with seventh graders who were reading below grade level[4]. We wanted to see if we could improve their reading comprehension by improving their "deep structure recovery" skills.

As it turned out, we did not significantly improve either their recovery skills or their comprehension skills, but we obtained some interesting data from the project. We had modified Simons' DSRT by adding additional items, and we had administered it and some other tests to pupils in grades 6, 7,

and 8. Scores obtained from eighth graders at the end of the project yielded a correlation of .59 between DSRT scores and cloze test scores and of .69 between DSRT and reading comprehension scores.

These data supported Simons' findings and seemed to indicate a strongly positive relationship between reading comprehension and certain aspects of sentence structure. It was not clear to me, however, exactly what aspects of syntactic structure were involved. Simons claimed his test measured ability to recover the deep structure of sentences; but after mulling it over, I came to believe that deep structure recovery, properly defined, ~~is~~ may be synonymous with comprehension. If so, it seems that the title of Simons' test is too ambitious.

Subsequently, I developed a test incorporating some features of my earlier structure test and some features of Simons' test. Item format was similar to that of the Simons test, but ~~like~~ as in my earlier test, reliance on syntactic cues was encouraged by the use of nonsense vocabulary. Trying not to claim more than the test could deliver, I called it the "Perception of Alternate Structures Test" (PAST)[5]. For an eighth grade group in Banks County (Georgia) High School, the correlation between PAST and reading comprehension scores was .41, almost the same as the correlation between my earlier test and reading comprehension.

Still not satisfied, I developed another test, using conventional English vocabulary and retaining some features of the Simons' test. Building on concepts and terminology derived from H. A. Gleason, Jr., I called it the "Agnate Sentences Test" (AST)[6]. It was designed to measure ability to perceive similarity of meaning of sentences that are structurally different. Presumably, successful performance on the test requires ability to respond to cues of syntactic structure in recovering the deep structure of sentences,

but it may also require other abilities. The correlation between AST scores and reading scores for eighth graders in Madison County (Georgia) Middle School was .65, which is nearly the same as the correlation between the Simons test and reading.

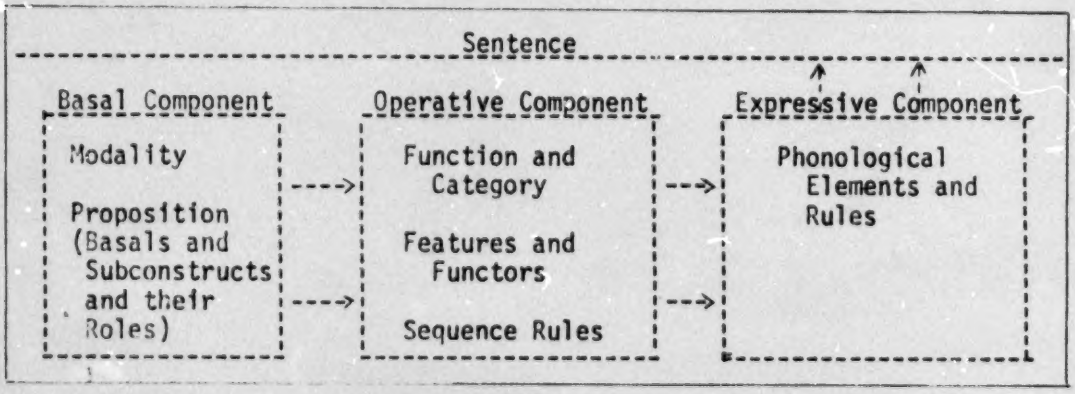
I do not wish to convey the impression that I intend to draw any firm conclusions from the data I have cited above. Although the various instruments seem to share at least some common features, they are sufficiently different to preclude precise comparisons. Nevertheless, viewing all the data together, I see what I think is a significant pattern. Those tests that utilize nonsense vocabulary to encourage reliance on syntactic cues have a low correlation with reading comprehension tests, while those that utilize conventional vocabulary and allow reliance on semantic as well as syntactic cues have noticeably higher correlations with reading. Perhaps the use of nonsense vocabulary introduces other variables that need to be considered; but I think the data, taken together with information about language acquisition, provide further insights into the puzzling results of my initial study.

Early in his study of children's language acquisition, Roger Brown[7], called attention to the "telegraphic" nature of children's first sentences. Before they develop control of the grammatical apparatus of language, children manage to make themselves understood by means of sentences almost devoid of syntactic cues. Apparently, they understand a great deal of the adult language used around them; and since they omit syntactic cues from their own utterances, one wonders how much attention they pay at this stage in their development to such cues in adult language. Since the language they learn is directly related to situations they experience; it could be a structure more basic than syntactic structure that they learn first. Subsequent language learning then would consist in part in relating this basic structure to syntactic structure.

Drawing from the linguistic theories of Chomsky, Fillmore, Chafe, and others, I have formulated an eclectic model of language consisting of three major components: a basal component, an operative component, and an expressive component[8]. Input for linguistic encoding is identified at the perceptual level. At the basal linguistic level, perceived events and states are encoded as semantic constructs. With appropriate syntactic and phonological elements supplied by the operative and expressive components, the output at the overt level is the sentence.

Constructs generated by the basal component consist of a modality index and a proposition. Propositions consist of related basal constituents and their respective semantic roles. These roles define the structural relations of the basal constituents. The operative component is divided into subcomponents, one of which assigns grammatical functions (subject, predicator, direct object, modifier, etc.) to basal constituents and categorizes them as nouns, verbs, adjectives, or adverbs. Another subcomponent supplies syntactic features and functors. Rules determining sequential order of elements in sentences also reside in the operative component. The expressive component consists primarily of phonological elements and rules, but is viewed broadly enough to include graphic and other forms of linguistic expression.

The relationships of the three major components to one another and to the overt sentence are illustrated in this diagram:



In speaking and writing, perceived events and states are encoded in semantic constructs, which are given syntactic and phonological or graphic features in the operative and expressive components. In listening and reading, overt structures are perceived and decoded. This decoding occurs at three levels, corresponding to the expressive, operative, and basal components of language; and at each of these levels there are redundant cues. At the expressive level combinations of phonological or graphic symbols are perceived by the listener/reader. At the operative level cues of syntactic structure are perceived. At the basal level the semantic features and roles of constituents in constructs are understood. To the extent that the decoded construct matches the construct encoded by the speaker/writer, comprehension occurs.

Since there is redundancy of structural cues at each of the three levels, the listener/reader may achieve comprehension without attending to all the cues. Ken Goodman[9] has provided a convincing description of the utilization of cues in the reading process.

> Reading is an active process in which the reader selects the fewest cues possible from those available to him and makes the best choices possible. If he is highly proficient he will have good speech and high comprehension; reading will be a smooth process. If he is less proficient or if he is encountering unusually difficult material. . ., reading will be less smooth and will involve considerable cycling back to gather more cues and make better choices.
>
> Meaning is the constant goal of the proficient reader and he continually tests his choices against the developing meaning by asking himself if what he is reading makes sense. The process does not require that he perceive and identify every cue. In fact that would be both unnecessary and inefficient. But it does require that the reader monitor his choices so he can recognize his errors and gather more cues when needed (pp. 19, 20).

Apparently, there are many instances when one can decode the underlying structure without attending to all the syntactic cues. This is not to say the syntactic cues are not important; indeed, they are essential to precision in expressing and in comprehending meaning. When the message can be comprehended without them, however, they are bypassed; but they are there for confirmation or correction as needed.

I still think Stella Center was right; the good reader does have to sense the relationship of a word to other words in a sentence. But I do not think the structural cues the reader relies on are exclusively syntactic. Apparently, semantic cues are frequently sufficient for the recovery of meaning; but when they are not, we fall back on syntactic cues. Thus, ability to sense relationships of words is essential, but the function of syntactic cues is that of supporting and/or clarifying cues of semantic structure.

Thus, it is to be expected that measures of sensitivity to syntactic cues, while correlating positively with measures of reading comprehension, would correlate less highly than semantic knowledge with such measures.

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